



6.9.4

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, Washington 98101


IN REPLY

REFER TO: OEA-095

August 9, 1999

MEMORANDUM

SUBJECT: Bunker Hill, CLP Metals Analysis, Data Validation  
Case: 27067  
SDG: MJAJ25

FROM:   
Laura Castrilli, Chemist  
Quality Assurance and Data Unit, OEA

TO: Mary Kay Voytilla, Regional Project Manager  
Office of Environmental Cleanup

147882

USEPA SF



1125014

CC: Bruce Woods, Region 10 CLP TPO  
Jim Stefanoff, CH2M Hill

The following is a validation of ICP-AES and mercury analyses of nineteen total water samples from the Bunker Hill project. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.0. Analyses were conducted by Chemtech Consulting Group, Inc., of Englewood, New Jersey. This validation was conducted for the following samples:

MJAJ25	MJAJ28	MJAJ31	MJAK17	MJAK20	MJAK23	MJAK25
MJAJ26	MJAJ29	MJAJ32	MJAK18	MJAK21	MJAK24	MJAK26
MJAJ27	MJAJ30	MJAK16	MJAK19	MJAK22		

**Data Qualifications**

The following comments refer to the Chemtech Laboratory's performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.0*. The comments presented herein are based on the information provided for the review.

**1.0 Timeliness - Acceptable**

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected between 05/27/99 and 05/28/99. Mercury analyses were completed on 06/11/99. ICP-AES analyses were completed on 06/30/99.

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## 2.0 Sample Preparation - Acceptable

The samples were prepared for mercury analyses on 06/11/99. The samples were prepared for ICP-AES analyses on 06/17/99.

## 3.0 Calibrations/Calibration Verifications - Acceptable

The samples were analyzed for mercury by CVAAS on 06/11/99. Initial calibration included one blank and five standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 06/30/99. The instrument was standardized according to the analytical method the day of analysis using one blank and a single calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Continuing calibration verifications (CCVs) are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%. The frequency of analysis of CCVs was met. All ICP-AES and CVAAS (mercury) CCVs (initial and continuing) bracketing reported sample results met the recovery criteria; therefore, no qualification was made on this basis.

## 4.0 Laboratory Control Samples - Acceptable

Laboratory Control samples are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria.

## 5.0 Blanks -

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Aluminum was detected in the preparation blank. Aluminum, antimony, calcium, and zinc were detected in one or more ICP-AES continuing calibration blanks (CCBs). Thallium had a negative value with an absolute value greater than the detection limit in a CCB. Based on blank contamination, associated sample results were qualified as follows:

- ◆ aluminum in samples MJAK18, MJAK22, MJAK23, and MJAK26 was qualified 'U'
- ◆ thallium in samples MJAJ25, MJAJ26, MJAJ28 through MJAJ32,

MJAK16, and MJAK18 was qualified 'J' or 'UJ'

All other sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified based on blank contamination.

#### 6.0 ICP-AES Interference Check Sample -

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS recoveries associated with reported sample results were within the recovery criterion.

The raw data for a number of samples had interfering levels of iron and/or manganese. The raw data for one sample also had an interfering level of magnesium. Analytes for which iron, manganese or magnesium are interferents were qualified as follows:

- ◆ The example analyte concentration equivalents in Table 2 of ILM04.0 was used to estimate interference in samples with manganese greater than 50 mg/L. Using professional judgement, chromium in samples MJAJ26, MJAJ28, MJAJ30, MJAJ32, MJAK17, MJAK20, MJAK21, and MJAK25 was qualified 'UJ', estimated detection limit (possible false positives due to high manganese) while chromium in sample MJAK24 was qualified 'J', estimated.
- Vanadium in samples MJAK21 and MJAK25 was qualified 'J', estimated due to high iron. Vanadium in the two ICS-A analyses bracketing these samples had results greater than the detection limit.

Some of the samples required a dilution to report zinc, iron, magnesium, and/or manganese results within the instrumental linear range. The raw data were compared using the available dilutions to see if 1) zinc, iron, and/or manganese levels in the undiluted samples were high enough that interelement corrections may not be sufficient for the analytes that were reported from the undiluted analyses or 2) a pattern of suppression or enhancement was evident.

This review was limited to an assessment of just cadmium, iron, manganese, lead, and zinc results. Based on this evaluation, the following analytes were qualified:

- ◆ Cadmium in samples MJAJ30, MJAJ31, MJAJ32, and MJAK24 was qualified 'J' (evidence of suppression).
- ◆ Manganese in sample MJAJ31 was qualified 'J' (evidence of suppression).

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## 7.0 Duplicate Analysis - Acceptable

Duplicate analyses were done on sample MJAJ25. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm$ CRDL criteria for water results < 5 times the CRDL criteria; therefore no results were qualified on this basis.

## 8.0 Field Duplicate Analysis - Not Applicable

Field duplicate analysis for samples in this SDG was not indicated in the field collection documentation.

## 9.0 Matrix Spike Analysis - Acceptable

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analyses were done on sample MJAJ25. All matrix spike recoveries were within the required QC limits; therefore no results were qualified on this basis.

## 10.0 Graphite Furnace Atomic Absorption Spec (GFAAS) QC - Not Applicable -

GFAAS was not used for the analysis of these samples.

## 11.0 ICP-AES Serial Dilution - Acceptable

Sample MJAJ25 was analyzed by ICP-AES serial dilution to check for potential interferences. All analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within the 10% criteria; therefore no results were qualified on this basis.

## 12.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached. Contract Required Detection Limit (CRDL) standards are required to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency.

## 13.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*. Approximately 6.6% of the data was qualified based on blank contamination or interference. The data as qualified is acceptable for all purposes.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when

validating/qualifying data from Inorganic analysis.

DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.
- R - The data are unusable. (Note: Analyte may or may not be present.)
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

EPA SAMPLE NO.

## INORGANIC ANALYSIS DATA SHEET

MJAJ25

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER

Lab Sample ID: 74157S

Level (low/med): LOW

Date Received: 05/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	156	B		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	25.5			P
7440-39-3	Barium	16.6	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	21.7			P
7440-70-2	Calcium	7940			P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	14.8	B		P
7440-50-8	Copper	17.8	B		P
7439-89-6	Iron	24900			P
7439-92-1	Lead	979			P
7439-95-4	Magnesium	4750	B		P
7439-96-5	Manganese	6100			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	13.2	B		P
7440-09-7	Potassium	1030	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	1.1	B		P
7440-23-5	Sodium	1030	B		P
7440-28-0	Thallium	7.0	U	J	P
7440-62-2	Vanadium	1.5	B		P
7440-66-6	Zinc	11700			P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAJ26

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER Lab Sample ID: 74160S

Level (low/med): LOW Date Received: 05/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	17100	—		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	865			P
7440-39-3	Barium	13.0	B		P
7440-41-7	Beryllium	7.5			P
7440-43-9	Cadmium	1440			P
7440-70-2	Calcium	32400			P
7440-47-3	Chromium	21.9		UJ	P
7440-48-4	Cobalt	156			P
7440-50-8	Copper	442			P
7439-89-6	Iron	744000			P
7439-92-1	Lead	1360			P
7439-95-4	Magnesium	60100			P
7439-96-5	Manganese	84800			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	87.6			P
7440-09-7	Potassium	684	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	19.3			P
7440-23-5	Sodium	1710	B		P
7440-28-0	Thallium	7.0	U	J	P
7440-62-2	Vanadium	11.4	B		P
7440-66-6	Zinc	531000			P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: YELLOW

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAJ27

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER Lab Sample ID: 74161S

Level (low/med): LOW Date Received: 05/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	828	—		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	18.5			P
7440-39-3	Barium	21.5	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	60.9			P
7440-70-2	Calcium	8990			P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	5.9	B		P
7440-50-8	Copper	30.6			P
7439-89-6	Iron	13900			P
7439-92-1	Lead	219			P
7439-95-4	Magnesium	10700			P
7439-96-5	Manganese	6950			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	6.0	B		P
7440-09-7	Potassium	519	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	1.2	B		P
7440-23-5	Sodium	950	B		P
7440-28-0	Thallium	7.0	U		P
7440-62-2	Vanadium	1.5	B		P
7440-66-6	Zinc	18100			P
	Cyanide				NR

05/28/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:



## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAJ28

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER

Lab Sample ID: 74162S

Level (low/med): LOW

Date Received: 05/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	29500	-		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	1530			P
7440-39-3	Barium	11.2	B		P
7440-41-7	Beryllium	11.8			P
7440-43-9	Cadmium	2340			P
7440-70-2	Calcium	45200			P
7440-47-3	Chromium	36.8		UJ	P
7440-48-4	Cobalt	257			P
7440-50-8	Copper	754			P
7439-89-6	Iron	144000			P
7439-92-1	Lead	1130			P
7439-95-4	Magnesium	76800			P
7439-96-5	Manganese	14500			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	141			P
7440-09-7	Potassium	668	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	31.8			P
7440-23-5	Sodium	1720	B		P
7440-28-0	Thallium	7.0	U	J	P
7440-62-2	Vanadium	10.6	B		P
7440-66-6	Zinc	90400			P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: YELLOW

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAJ29

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER Lab Sample ID: 74163S

Level (low/med): LOW Date Received: 05/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	167	B		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	30.4			P
7440-39-3	Barium	19.6	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	21.4			P
7440-70-2	Calcium	9260			P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	15.2	B		P
7440-50-8	Copper	30.0			P
7439-89-6	Iron	25900			P
7439-92-1	Lead	986			P
7439-95-4	Magnesium	4950	B		P
7439-96-5	Manganese	6200			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	13.8	B		P
7440-09-7	Potassium	1050	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	1.6	B		P
7440-23-5	Sodium	1440	B		P
7440-28-0	Thallium	7.0	U	J	P
7440-62-2	Vanadium	2.3	B		P
7440-66-6	Zinc	11800			P
	Cyanide				NR

JL 05/09/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: YELLOW

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAJ30

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: . SDG No.: MJAJ25

Matrix (soil/water): WATER Lab Sample ID: 74291S

Level (low/med): LOW Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	61100	-		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	5660			P
7440-39-3	Barium	11.8	B		P
7440-41-7	Beryllium	11.5			P
7440-43-9	Cadmium	3110		J	P
7440-70-2	Calcium	80100			P
7440-47-3	Chromium	39.0		UJ	P
7440-48-4	Cobalt	1100			P
7440-50-8	Copper	6200			P
7439-89-6	Iron	1690000			P
7439-92-1	Lead	453			P
7439-95-4	Magnesium	113000			P
7439-96-5	Manganese	174000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	707			P
7440-09-7	Potassium	830	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	37.4			P
7440-23-5	Sodium	1970	B		P
7440-28-0	Thallium	7.0	U	J	P
7440-62-2	Vanadium	24.6	B		P
7440-66-6	Zinc	1090000			P
	Cyanide				NR

Color Before: YELLOW

Clarity Before: CLEAR

Texture:

Color After: YELLOW

Clarity After: CLEAR

Artifacts:

Comments:

EPA SAMPLE NO.

## INORGANIC ANALYSIS DATA SHEET

MJAJ31

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER Lab Sample ID: 74292S

Level (low/med): LOW Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	213000	-		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	22800			P
7440-39-3	Barium	19.2	B		P
7440-41-7	Beryllium	32.4			P
7440-43-9	Cadmium	11100			P
7440-70-2	Calcium	144000			P
7440-47-3	Chromium	94.7			P
7440-48-4	Cobalt	3610			P
7440-50-8	Copper	17000			P
7439-89-6	Iron	6610000			P
7439-92-1	Lead	134			P
7439-95-4	Magnesium	223000		J	P
7439-96-5	Manganese	46500			P
7439-97-6	Mercury	0.50			CV
7440-02-0	Nickel	2340			P
7440-09-7	Potassium	354	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	138			P
7440-23-5	Sodium	2810	B		P
7440-28-0	Thallium	7.0	U	J	P
7440-62-2	Vanadium	108			P
7440-66-6	Zinc	6010000			P
	Cyanide				NR

Color Before: BROWN

Clarity Before: CLOUDY

Texture:

Color After: YELLOW

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAJ32

Lab Name: CHEMTECH CONSULTING GROUP

Contract: 68-D5-0166

Lab Code: CHEM

Case No.: 27067

SAS No.:

SDG No.: MJAJ25

Matrix (soil/water): WATER

Lab Sample ID: 74293S

Level (low/med): LOW

Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	81900	—		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	6630			P
7440-39-3	Barium	12.7	B		P
7440-41-7	Beryllium	15.3			P
7440-43-9	Cadmium	3800		J	P
7440-70-2	Calcium	55700			P
7440-47-3	Chromium	56.3		UJ	P
7440-48-4	Cobalt	1220			P
7440-50-8	Copper	7160			P
7439-89-6	Iron	2520000			P
7439-92-1	Lead	492			P
7439-95-4	Magnesium	119000			P
7439-96-5	Manganese	257000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	682			P
7440-09-7	Potassium	838	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	52.8			P
7440-23-5	Sodium	1780	B		P
7440-28-0	Thallium	7.0	U	J	P
7440-62-2	Vanadium	30.8	B		P
7440-66-6	Zinc	1600000			P
	Cyanide				NR

2/208/09/99

Color Before: YELLOW

Clarity Before: CLEAR

Texture:

Color After: YELLOW

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAK16

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER Lab Sample ID: 74294S

Level (low/med): LOW Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1010	—		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	38.5			P
7440-39-3	Barium	5.1	B		P
7440-41-7	Beryllium	1.1	B		P
7440-43-9	Cadmium	1.0	U		P
7440-70-2	Calcium	3450	B		P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	8.1	B		P
7440-50-8	Copper	18.2	B		P
7439-89-6	Iron	19100			P
7439-92-1	Lead	26.6			P
7439-95-4	Magnesium	1590	B		P
7439-96-5	Manganese	1870			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	4.4	B		P
7440-09-7	Potassium	480	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	1.0	U		P
7440-23-5	Sodium	727	B		P
7440-28-0	Thallium	7.0	U	J	P
7440-62-2	Vanadium	1.0	U		P
7440-66-6	Zinc	528			P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

EPA SAMPLE NO.

## INORGANIC ANALYSIS DATA SHEET

MJAK17

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER Lab Sample ID: 74295S

Level (low/med): LOW Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	39100	—		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	3600			P
7440-39-3	Barium	23.3	B		P
7440-41-7	Beryllium	7.8			P
7440-43-9	Cadmium	2070			P
7440-70-2	Calcium	63300			P
7440-47-3	Chromium	29.8		UJ	P
7440-48-4	Cobalt	732			P
7440-50-8	Copper	3910			P
7439-89-6	Iron	912000			P
7439-92-1	Lead	630			P
7439-95-4	Magnesium	110000			P
7439-96-5	Manganese	128000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	477			P
7440-09-7	Potassium	999	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	27.2			P
7440-23-5	Sodium	2180	B		P
7440-28-0	Thallium	7.0	U		P
7440-62-2	Vanadium	24.0	B		P
7440-66-6	Zinc	715000			P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAK18

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER Lab Sample ID: 74296S

Level (low/med): LOW Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	122	B	U	P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	6.0	U		P
7440-39-3	Barium	75.3	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	22.5			P
7440-70-2	Calcium	17800			P
7440-47-3	Chromium	1.5	B		P
7440-48-4	Cobalt	12.6	B		P
7440-50-8	Copper	20.4	B		P
7439-89-6	Iron	2210			P
7439-92-1	Lead	1250			P
7439-95-4	Magnesium	46000			P
7439-96-5	Manganese	11900			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	16.6	B		P
7440-09-7	Potassium	978	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.9	B		P
7440-23-5	Sodium	1570	B		P
7440-28-0	Thallium	10.0	B	J	P
7440-62-2	Vanadium	4.5	B		P
7440-66-6	Zinc	3320			P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:



INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAK19

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER Lab Sample ID: 74297S

Level (low/med): LOW Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	2690			P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	40.5			P
7440-39-3	Barium	19.0	B		P
7440-41-7	Beryllium	2.1	B		P
7440-43-9	Cadmium	242			P
7440-70-2	Calcium	15000			P
7440-47-3	Chromium	4.9	B		P
7440-48-4	Cobalt	27.9	B		P
7440-50-8	Copper	87.2			P
7439-89-6	Iron	79600			P
7439-92-1	Lead	529			P
7439-95-4	Magnesium	23200			P
7439-96-5	Manganese	21000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	23.1	B		P
7440-09-7	Potassium	653	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	5.7	B		P
7440-23-5	Sodium	1420	B		P
7440-28-0	Thallium	7.0	U		P
7440-62-2	Vanadium	7.7	B		P
7440-66-6	Zinc	87300			P
	Cyanide				NR

*See 08/09/99*

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

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EPA SAMPLE NO.

## INORGANIC ANALYSIS DATA SHEET

MJAK20

Lab Name: CHEMTECH CONSULTING GROUP

Contract: 68-D5-0166

Lab Code: CHEM

Case No.: 27067

SAS No.:

SDG No.: MJAJ25

Matrix (soil/water): WATER

Lab Sample ID: 74298S

Level (low/med): LOW

Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	33700	-		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	2970			P
7440-39-3	Barium	5.9	B		P
7440-41-7	Beryllium	7.7			P
7440-43-9	Cadmium	2280			P
7440-70-2	Calcium	106000			P
7440-47-3	Chromium	24.7		43	P
7440-48-4	Cobalt	755			P
7440-50-8	Copper	4700			P
7439-89-6	Iron	850000			P
7439-92-1	Lead	887			P
7439-95-4	Magnesium	91600			P
7439-96-5	Manganese	107000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	604			P
7440-09-7	Potassium	623	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	25.4			P
7440-23-5	Sodium	1860	B		P
7440-28-0	Thallium	7.0	U		P
7440-62-2	Vanadium	20.1	B		P
7440-66-6	Zinc	721000			P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: YELLOW

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAK21

Lab Name: CHEMTECH CONSULTING GROUP

Contract: 68-D5-0166

Lab Code: CHEM

Case No.: 27067

SAS No.:

SDG No.: MJAJ25

Matrix (soil/water): WATER

Lab Sample ID: 74299S

Level (low/med): LOW

Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	37900	—	—	P
7440-36-0	Antimony	5.0	U	—	P
7440-38-2	Arsenic	3510	—	—	P
7440-39-3	Barium	22.8	B	—	P
7440-41-7	Beryllium	7.7	—	—	P
7440-43-9	Cadmium	2010	—	—	P
7440-70-2	Calcium	61400	—	—	P
7440-47-3	Chromium	27.8	—	uJ	P
7440-48-4	Cobalt	709	—	—	P
7440-50-8	Copper	3790	—	—	P
7439-89-6	Iron	885000	—	—	P
7439-92-1	Lead	635	—	—	P
7439-95-4	Magnesium	107000	—	—	P
7439-96-5	Manganese	123000	—	—	P
7439-97-6	Mercury	0.20	U	—	CV
7440-02-0	Nickel	464	—	—	P
7440-09-7	Potassium	970	B	—	P
7782-49-2	Selenium	4.0	U	—	P
7440-22-4	Silver	26.6	—	—	P
7440-23-5	Sodium	2100	B	—	P
7440-28-0	Thallium	7.0	U	—	P
7440-62-2	Vanadium	26.1	B	J	P
7440-66-6	Zinc	683000	—	—	P
	Cyanide		—	—	NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: YELLOW

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAK22

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER

Lab Sample ID: 74300S

Level (low/med): LOW

Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	61.9	B	U	P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	21.9			P
7440-39-3	Barium	12.5	B		P
7440-41-7	Beryllium	1.3	B		P
7440-43-9	Cadmium	11.0			P
7440-70-2	Calcium	31700			P
7440-47-3	Chromium	4.0	B		P
7440-48-4	Cobalt	2.4	B		P
7440-50-8	Copper	24.8	B		P
7439-89-6	Iron	27800			P
7439-92-1	Lead	283			P
7439-95-4	Magnesium	35300			P
7439-96-5	Manganese	18400			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	2.5	B		P
7440-09-7	Potassium	1090	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	4.4	B		P
7440-23-5	Sodium	1500	B		P
7440-28-0	Thallium	7.1	B		P
7440-62-2	Vanadium	7.9	B		P
7440-66-6	Zinc	4570			P
	Cyanide				NR

JTC 08/09/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: YELLOW

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAK23

Lab Name: CHEMTECH CONSULTING GROUP

Contract: 68-D5-0166

Lab Code: CHEM

Case No.: 27067

SAS No.:

SDG No.: MJAJ25

Matrix (soil/water): WATER

Lab Sample ID: 74301S

Level (low/med): LOW

Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	86.8	B	U	P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	6.0	U		P
7440-39-3	Barium	6.2	B		P
7440-41-7	Beryllium	1.1	B		P
7440-43-9	Cadmium	32.7			P
7440-70-2	Calcium	31700			P
7440-47-3	Chromium	9.0	B		P
7440-48-4	Cobalt	7.2	B		P
7440-50-8	Copper	11.3	B		P
7439-89-6	Iron	5750			P
7439-92-1	Lead	808			P
7439-95-4	Magnesium	91700			P
7439-96-5	Manganese	38100			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	17.1	B		P
7440-09-7	Potassium	1330	B		P
7782-49-2	Selenium	9.3			P
7440-22-4	Silver	10.0	B		P
7440-23-5	Sodium	2520	B		P
7440-28-0	Thallium	7.0	U		P
7440-62-2	Vanadium	14.1	B		P
7440-66-6	Zinc	12900			P
	Cyanide				NR

2/20/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAK24

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER

Lab Sample ID: 74302S

Level (low/med): LOW

Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	607			P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	6.0	U		P
7440-39-3	Barium	5.2	B		P
7440-41-7	Beryllium	1.9	B		P
7440-43-9	Cadmium	155		J	P
7440-70-2	Calcium	198000			P
7440-47-3	Chromium	86.7		J	P
7440-48-4	Cobalt	132			P
7440-50-8	Copper	14.2	B		P
7439-89-6	Iron	70.6	B		P
7439-92-1	Lead	463			P
7439-95-4	Magnesium	888000			P
7439-96-5	Manganese	400000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	172			P
7440-09-7	Potassium	5780			P
7782-49-2	Selenium	78.1			P
7440-22-4	Silver	99.9			P
7440-23-5	Sodium	5360			P
7440-28-0	Thallium	7.0	U		P
7440-62-2	Vanadium	1.0	U		P
7440-66-6	Zinc	149000			P
	Cyanide				NR

11/02/01/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

. MJAK25

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER Lab Sample ID: 74303S

Level (low/med): LOW Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	26600	-		P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	1820			P
7440-39-3	Barium	6.0	B		P
7440-41-7	Beryllium	6.6			P
7440-43-9	Cadmium	1510			P
7440-70-2	Calcium	37100			P
7440-47-3	Chromium	23.8		UJ	P
7440-48-4	Cobalt	576			P
7440-50-8	Copper	3890			P
7439-89-6	Iron	793000			P
7439-92-1	Lead	498			P
7439-95-4	Magnesium	58500			P
7439-96-5	Manganese	104000			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	392			P
7440-09-7	Potassium	510	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	21.7			P
7440-23-5	Sodium	1580	B		P
7440-28-0	Thallium	7.0	U		P
7440-62-2	Vanadium	19.6	B	J	P
7440-66-6	Zinc	459000			P
	Cyanide				NR

See 08/09/99

Color Before: COLORLESS

Clarity Before: CLOUDY

Texture:

Color After: YELLOW

Clarity After: CLEAR

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAK26

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 27067 SAS No.: SDG No.: MJAJ25

Matrix (soil/water): WATER Lab Sample ID: 74304S

Level (low/med): LOW Date Received: 05/29/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	34.5	B	U	P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	20.4			P
7440-39-3	Barium	7.8	B		P
7440-41-7	Beryllium	1.0	B		P
7440-43-9	Cadmium	1.0	U		P
7440-70-2	Calcium	9990			P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	18.1	B		P
7440-50-8	Copper	13.9	B		P
7439-89-6	Iron	52300			P
7439-92-1	Lead	2.0	U		P
7439-95-4	Magnesium	3540	B		P
7439-96-5	Manganese	5010			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	8.2	B		P
7440-09-7	Potassium	1080	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	1.0	U		P
7440-23-5	Sodium	978	B		P
7440-28-0	Thallium	11.0			P
7440-62-2	Vanadium	2.5	B		P
7440-66-6	Zinc	952			P
	Cyanide				NR

12/08/99

Color Before: COLORLESS

Clarity Before: CLOUDY

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments: